

(No Model.)

3 Sheets—Sheet 1.

W. SWINDELL.

GAS FURNACE.

No. 334,306.

Patented Jan. 12, 1886.

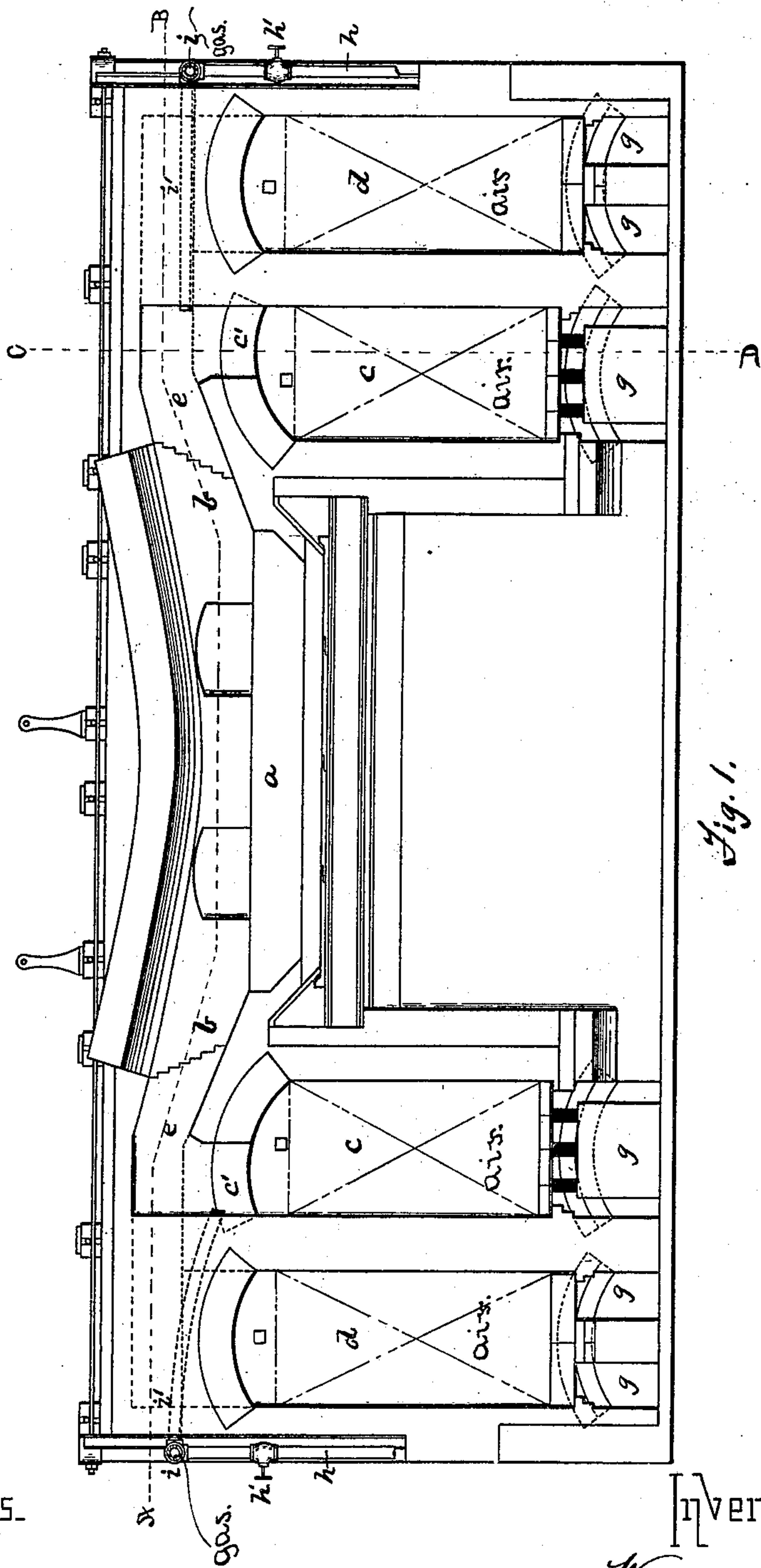


Fig. 1.

Witnesses.

J. A. Burns
W. H. Corwin

Inventor.

William Swindell
by his attys
Bakewell & Kerr

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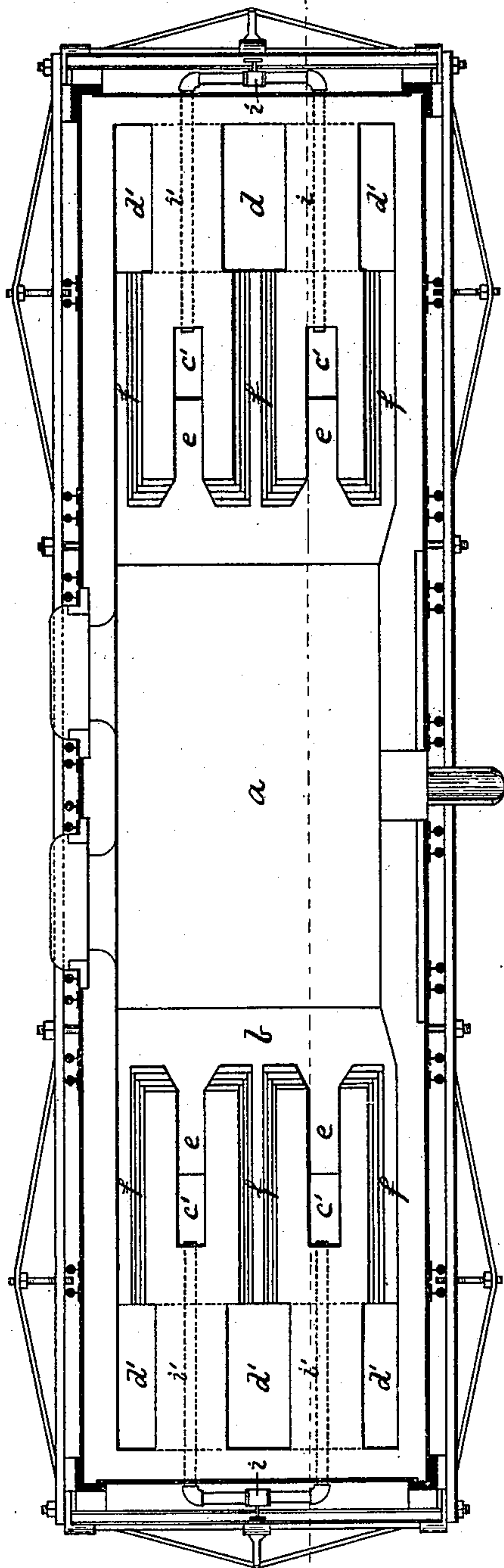


Fig. 2.

Witnesses.

J. A. Burns.
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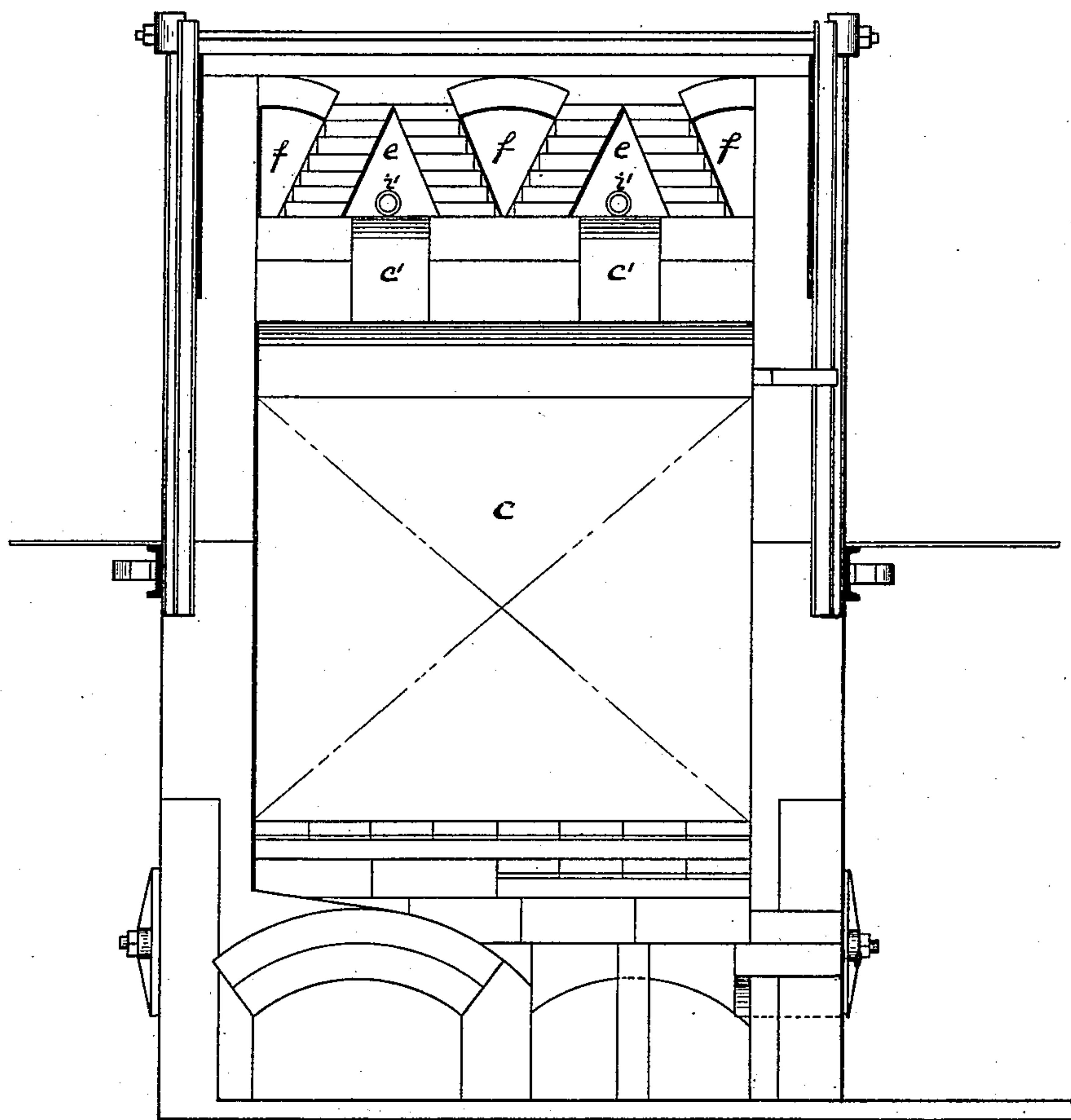


Fig. 3.

Witnesses.

J. A. Burns.
W. H. Convis.

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UNITED STATES PATENT OFFICE.

WILLIAM SWINDELL, OF ALLEGHENY CITY, PENNSYLVANIA.

GAS-FURNACE.

SPECIFICATION forming part of Letters Patent No. 334,306, dated January 12, 1886.

Application filed August 25, 1884. Serial No. 141,410. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM SWINDELL, of Allegheny City, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Gas-Furnaces; and I do hereby declare the following to be a full, clear, and exact description thereof.

In the utilization of natural gas for metallurgical purposes many different ways have been devised for supplying the gas to the furnaces and of mixing the same with the air which supports its combustion. It has been found that to obtain the best results the gas needs to be supplied to the point of combustion in a cold state, and that the air should be highly heated. One of the difficulties in obtaining perfect combustion has been to effect the thorough commingling of the gas and air. Another difficulty is that the gas and air are liable to unite with too strong or fierce combustion in the neck or bridge flue, and thus cut out the walls at that point. In the former constructions known to me the gas has been supplied either above or below the air, and as it naturally followed the adjacent wall it did not become so fully mixed with the air as to burn with the best results. My invention is designed to obviate this difficulty while observing other conditions found to be desirable; and it may be stated to consist, mainly, in supplying it between two streams or currents of hot air, which are relatively so proportioned as to effect the complete union of the gas and air, and the proper application of the resultant heat and flame to the furnace.

To enable others skilled in the art to make and use my invention, I will now describe it by reference to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of my improved furnace. Fig. 2 is a horizontal section on the line A B of Fig. 1. Fig. 3 is a vertical transverse section on the line C D of Fig. 1.

Like letters of reference indicate like parts in each.

The furnace has a bed, *a*, neck or bridge flues *b*, double regenerator or air-heating chambers *c d* on each side, flues or ports *e*, extending between the bridge-flues *b* and the upper ends of the regenerator-chambers *c*, and

flues or ports *f*, extending between the bridge-flues *b* and the upper ends of the regenerator-chambers *d*. The regenerator-chambers *c d* are designed to be filled with checker-work, and are connected with the air-inlet pipes and with the stack by means of the flues or conduits *g*, in the usual manner of reversible regenerator-furnaces. The waste heat and gases from the bed pass for a while through one pair of chambers to the stack, heating up the checker-work therein, while the air passes in through the other pair of regenerators. From time to time the course of the currents is reversed, so that the air may be caused to pass through the heated chambers. This reversal is effected by means of reversing-valves, which are placed at the junction of the flues *g* with the air-inlet and stack flues.

As the construction and arrangement of the reversing-valves and of the air-inlet and stack flues are the same as in ordinary reversing regenerator-furnace, and are well known, I will not describe them.

At each end of the furnace is a main gas-pipe, *h*, controlled by a valve, *h'*, and terminating in a distributing-pipe, *i*, which has any desired number of branch pipes, *i'*, said branch pipes extending through the walls and terminating at the rear side of the vertical ports *e'*, which lead up from the chambers *c* to the flues *e*. The walls through which the branch pipes *i'* extend are situated between the vertical ports *d'*, by which the regenerator-chambers *d* communicate with the outer ends of the flues *f*.

As shown in the drawings, the flues *e* and *f* are of triangular form in cross-section, being separated by inclined division-walls. I make no claim herein to the particular form of these flues in connection with the gas-pipes, as the latter may be used with other well-known forms of flues for supplying hot air from the regenerator-chambers to the bed. This construction and arrangement of gas pipes and flues enables the hot air from the regenerator-chambers *c* to strike the streams of gas from the pipes *i'* on the under side, while the hot air from the regenerator-chambers *d* strikes the streams on the upper side, so that the gas is drawn into the furnace-bed through the flues *b* between two streams of hot air, and does not become thoroughly mixed therewith to effect perfect com-

bustion until it reaches the bed *a*. The result is that the walls surrounding the flues are protected from the cutting effect of the intense heat which is produced by the complete combustion of the gas, and such heat is generated in the bed where it is used. In addition to this, the gradual admixture of the hot air with the gas brings the latter into better condition for its final and complete combustion.

10 It has been my experience in the use of natural gas in furnaces that where the flame of complete combustion is directed against one part of the furnace, as will usually result from supplying it with a draft of hot air from one
15 side only, the walls at the point of impingement will rapidly melt down or waste, the consequence of which is that the heat is not properly utilized for the work intended, and frequent and expensive repairs are necessary.
20 As the currents of hot air from the chambers *c* enter the flues *e* laterally, and the volume, if too great, would have the effect of driving the gas against the top of the flues, I reduce the quantity of air entering through the chambers
25 *c* by partially closing the entrant-valves, which admit air to the lower flues, *g*, of said chambers. It is desirable to have only a sufficient volume of air to mix partially with the gas and to protect the bridge-walls and the lower sides
30 of the flues *e*. I prefer that the amount of air entering through the chambers *c* and *d* should be in the relative proportion of one to two. Practical experience has demonstrated that

this manner of supplying natural gas to the ordinary double-chamber regenerator-furnace, 35 which has heretofore been used with a gas-producer, effects a large saving in the matter of repairs, and much more perfect and thorough utilization of the gas used.

I do not limit myself to the use of natural 40 gas, but contemplate also using any purified gas which can be supplied through the pipes *i'*, in contradistinction to the ordinary unpurified gas generated in an ordinary gas-producer such as has heretofore been used in these fur- 45 naces.

What I claim as my invention, and desire to secure by Letters Patent, is—

The combination, in a metallurgical furnace, of double air-regenerators and their hot-air 50 ports with gas-pipes arranged to supply gas at a point or points above the air-ports leading from one regenerator and relatively below the air-ports of the other regenerator, so that hot air from the first regenerator shall enter the 55 furnace below the current of gas, and hot air from the second regenerator shall be thrown into the furnace over the current of gas, substantially as and for the purposes described.

In testimony whereof I have hereunto set 60 my hand this 7th day of August, A. D. 1884.

WILLIAM SWINDELL.

Witnesses:

W. B. CORWIN,
THOMAS B. KERR.